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# 1992

# PLAN OF WORK

## *for*
## *Cooperative Hydrology Investigations*

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Bureau of Land Management and U.S. Geological Survey — Water Resources Division

**UNITED STATES DEPARTMENT OF THE INTERIOR**
**BUREAU OF LAND MANAGEMENT**
**SERVICE CENTER**
**DENVER FEDERAL CENTER, BUILDING 50**
**P.O. BOX 25047**
**DENVER, COLORADO 80225-0047**

In Reply Refer To:
7200 (SC-210)

August 21, 1992

Information Bulletin No. SC-92-253

To: All State Directors

From: Service Center Director

Subject: FY 1992 Final Plan of Work for BLM/USGS Cooperative Hydrology Investigation Program, IA-1422-N651-A2-3002

The current year's Plan of Work is attached with enough copies for your participating offices. The attachment is the "scope of work" for the umbrella Interagency Agreement (IA) executed annually since 1974 with USGS to conduct cooperative hydrology investigations. Although the majority of projects are funded by the Soil, Water, and Air subactivity, a few are funded by other Bureau programs (Hazardous Materials, Coal, and Oil and Gas).

Any BLM office desiring to have USGS (Water Resources or Geologic Divisions) perform professional services may have its procurement added to the umbrella IA by contacting Eric Janes, COR in SC-212A. Also, there is a procedure for amending the Plan of Work during the second half of the FY to incorporate new tasks or modify existing work based on new information. Beginning this FY, we are requesting requisitions to cover any task(s) under this IA.

Adding your requirements to this IA eliminates the need to write a local IA, and it channels USGS reimbursement billings and paperwork through one BLM contract officer instead of several. Field offices are still free to monitor USGS studies and manage technical direction of their projects.

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# USGS/BLM COOPERATIVE HYDROLOGY INVESTIGATIONS PROGRAM

1992

## PLAN OF WORK

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Denver, CO 80225

## Preface

The Bureau of Land Management (BLM) each year requires data collection and analysis and technical consulting services of its sister agency, the U.S. Geological Survey (GS). For Fiscal Year 1992 services are requested of the GS's Water Resources Division.

The Plan of Work includes both Federal Coal Management Program (CMP) and non-CMP work items. Non-CMP work items are identified by a separate BLM appropriation code included in each work item description. Agency technical contacts for the 1992 BLM/GS contract are as follows:

### Bureau of Land Management

Service Center

Eric B. Janes, Contracting Officer's Representative, and Hydrologist (303-236-0170).

### U.S. Geological Survey

Water Resources Division

William M. Kastner, Regional Program Officer, Central Region (303-236-5932)

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PLAN OF WORK
FOR
HYDROLOGIC INVESTIGATIONS
BUREAU OF LAND MANAGEMENT AND
USGS WATER RESOURCES DIVISION
FY 1992

| STATE | O&G | COAL | SW&A | HAZMAT | SWA O&C | FISHERIES O&C | TOTAL |
|---|---|---|---|---|---|---|---|
| | 4110 | 4120 | 4340 | 4760 | 6333 | 6334 | |
| Colorado | | $5,500 | $29,475 | | | | $ 34,975 |
| Montana | | | 16,000 | $95,000 | | | 111,000 |
| Nevada | | | 67,300 | | | | 67,300 |
| New Mexico | $15,000 | | 35,000 | | | | 50,000 |
| Oregon | | | | | $26,680 | $1,750 | 28,430 |
| Utah | | | 570,000 | | | | 570,000 |
| SC-210 | | | 4,500 | | | | 4,500 |
| | $15,000 | $5,500 | $722,275 | $95,000 | $26,680 | $1,750 | $866,205 |

PLAN OF WORK
for
HYDROLOGIC INVESTIGATIONS
BUREAU OF LAND MANAGEMENT AND
USGS WATER RESOURCES DIVISION
Fiscal Year 1992

## AUTHORITY

The General Agreement between the Bureau of Land Management (BLM) and the Geological Survey (GS), dated June 14, 1985, is considered the basis for this Plan of Work.

## PURPOSE

The purpose of this Plan of Work is to specify the nature and amount of assistance to be provided by GS to BLM during FY 92.

## SCOPE

This Plan of Work includes hydrologic services to be provided by GS to BLM in Fiscal Year 1992 in the States of Colorado, Montana, Nevada, New Mexico, Oregon, Utah, and Washington. Also, work is included for BLM's Service Center by a Vancouver, Washington Water Resources Division Laboratory.

GS will provide the services, including personnel, equipment, supplies, and facilities, to conduct water resources investigations in areas designated by BLM. Services will include installation, operation, and maintenance of surface-water gages, ground-water wells, and climate stations, water-quality data collection and analysis.

## PROCEDURE

Fiscal Year 1992 is the eighteenth year of this cooperative effort. Some work that began in earlier fiscal years will be continued in Fiscal Year 1992, although some projects may be dropped. A few studies will begin in Fiscal Year 1992; some will carry over into Fiscal Year 1993. Proposals will be discussed in joint meetings among GS WRD District Offices, BLM field offices, and the Service Center. The Plan of Work will be developed by the Service Center after negotiations among BLM field offices to determine needs and GS field offices to determine capabilities, recommended hydrologic procedures, and to coordinate with other studies conducted by GS in other programs. The development of budgets takes into account the program needs of both agencies and funds available to meet those needs. When mutual interests are strong, funds from both agencies are applied. Funds tabulated in the Plan of Work, however, represent only those from BLM.

Field investigative procedures will be standard GS techniques for water resources investigation.

REPORTS

Reporting will generally be standard GS report procedures with some deviations that are detailed in the Plan of Work. For terms of reference, where a particular project culminates in a specific kind of USGS publication (such as a Professional Paper or Water Resources Investigation Report), the various report types are defined in the monthly "New Publications of the U.S. Geological Survey."

For some investigations, annual project progress reports will be prepared by Water Resources Division Districts and routed through the Central Region to the Contracting Officer's Representative (BLM). Due date for these reports will be September 30, 1992. GS will provide the appropriate BLM State Office with a copy of each progress report.

Prior to publishing any work involving BLM funds, GS will forward copies of the draft final project report to the appropriate BLM State Office contact for review and approval. GS will forward two copies of the published reports to the Contracting Officer's Representative (BLM) and as many copies to the appropriate BLM State Office as agreed upon mutually between GS and BLM.

FUNDING

BLM will provide $866,205 to GS to cover all authorized work listed in this Plan of Work and performed during the period October 1, 1991 to September 30, 1992. Billing will be through OPAC Form, which will be current as of the beginning of the quarter during which the interagency agreement is signed. OPAC bills must reflect the agreement number with applicable tasks identified and BLM fund codes along with a brief description of the work, e.g., project title as listed in this work plan. Subsequent bills will be issued at 3-month intervals except during the last quarter when bills will be submitted at 1- to 2-month intervals. As a part of the interagency agreement and/or modifications thereto, BLM will provide a table showing funding sources for BLM/USGS cooperative hydrology investigations. GS will consider this account a reimbursable account with 1-year funds.

COLORADO

SUMMARY OF FUNDS - FY 92
WATER RESOURCES DIVISION

| | Project Name | 4120 | 4340 |
|---|---|---|---|
| I. | Hydrologic Investigations, Badger Creek | | $ 23,210 |
| II. | Sand Wash | | 1,315 |
| III. | Foidel Creek | $ 5,500 | |
| IV. | Three Mile Creek Watershed Project | | 4,950 |
| | TOTAL | $ 5,500 | $ 29,475 |

Total for State of Colorado: $ 34,975

COLORADO

H. Robert Moore, BLM, State Director (303-239-3700)
William Carey, BLM Hydrologic Investigations Coordinator (303-239-3722)
David J. Lystrom, WRD, District Chief (303-236-4882)

I. Hydrologic Investigation of Badger Creek

Ron D. Steger, WRD Project Chief, (719-544-7155)

A. Location: Badger Creek, tributary to Arkansas River

B. Objectives: To determine surface-water quantity and sediment-yield characteristics of Badger Creek watershed at two data collection sites. Crest-stage gages will also be operated at four sites in the Badger Creek watershed to determine source areas of flood discharge.

C. Report Products: Data are published annually in Water Resources Data for Colorado.

D. Distribution of Funds: CO-050-4340-06-255S-RPRN

| | |
|---|---|
| Salaries | $16,290 |
| Travel and Vehicles | 2,560 |
| Laboratory | 4,360 |
| TOTAL | $23,210 |

E. Project Duration: Through FY 2000

II. Sand Wash

Eddie A. Wilson, Grand Junction Office, USGS, (303-245-5257)

A. Location: Sand Wash Basin is in northwestern Colorado, approximately 50 miles west-northwest of Craig.

B. Objectives: Continue to collect flow, sediment, and water-quality data to define the hydrologic characteristics of Sand Wash Basin.

C. Approach: Collect one water-quality sample with discharge measurement and suspended sediment sample. Data will be collected using standard techniques for water resources investigation (TWRI) of the Water Resources Division.

D. Reports: All data will be published in Water Resources Data for Colorado.

E. Distribution of Funds: (CO-010-4340-14-255S)

| | |
|---|---|
| Manpower | $ 540 |
| Vehicles and Travel | 270 |
| Laboratory | 430 |
| Supplies & Equipment | 75 |
| TOTAL | $ 1,315 |

F. Project Duration: This project will run a minimum of five years.

III. Foidel Creek

Eddie A. Wilson, Grand Junction Office, USGS, (303-245-5257)

A. Location: The upper Foidel Creek basin is approximately nine miles west of Oak Creek, Colorado. Foidel Creek is a minor tributary in the Fish Creek-Trout Creek drainage system of the Yampa River basin.

B. Objective: Operate a continuous recording precipitation gage and collect snow course data in the upper Foidel Creek basin. Collect periodic water-quality data at the USGS gaging station on upper Foidel Creek.

C. Approach:

1. Maintain continuous data collection at the USGS precipitation gage 401751107062000.

2. Collect snow depth and water content at gage 401751107062000 . . . 2-3 measurements per year.

3. Collect water samples for laboratory analyses of major ions at the USGS gaging station 09243800 in upper Foidel Creek . . . 4 samples per year.

D. Reports: All data will be published in the USGS annual water-data report.

E. Distribution of Funds: (CO-010-4120-06-255S)

| | |
|---|---|
| Manpower | $ 3,700 |
| Vehicles and Travel | 900 |
| Laboratory | 350 |
| Supplies & Equipment | 550 |
| TOTAL | $ 5,500 |

F. Project Duration: The final year of station operation will be FY 96.

## IV. Threemile Creek Watershed Project

Millard Hiner, WRD Project Chief, Lakewood Subdistrict, (303-236-9404)

A. Location: Three sites on Threemile Creek--upper, middle, and near the mouth. Threemile Creek is a tributary to the South Platte River about 3 miles downstream of Elevenmile Reservoir.

B. Objective: Define stage/discharge relation and sediment concentration at three intermittent streams sites.

C. Approach:

1. Operate and maintain three crest-stage gages and instantaneous single-stage sediment samplers.

2. Visit monthly and make discharge measurements if flowing at each site to develop stage-discharge rating. Make at least one indirect measurement at each site.

3. Collect one sediment sample per year at each site for sediment concentration analysis. Collect periodic sediment samples when flow conditions warrant.

D. Reports: All data will be published in the USGS annual water-data report.

E. Distribution of Funds: CO-050-4340-14-255S

| | |
|---|---|
| Manpower | $ 3,600 |
| Vehicles and Travel | 600 |
| Laboratory | 700 |
| Supplies & Equipment | 50 |
| TOTAL | $ 4,950 |

F. Project Duration: Through FY 2002

MONTANA

SUMMARY OF FUNDS - FY 92
WATER RESOURCES DIVISION

| Project Name | 4340 | 4760 |
|---|---|---|
| I. Cherry Creek Monitoring | $ 16,000 | |
| II. Flint Creek Monitoring | | $ 35,000 |
| III. Landfill Characterization | | 60,000 |
| TOTAL | $ 16,000 | $ 95,000 |

Total for State of Montana: $ 111,000

MONTANA

Robert Lawton, BLM State Director (406-255-2904)
Tim Bozorth, BLM Hydrologic Investigations Coordinator (406-255-2794)
Joe A. Moreland, WRD, District Chief (406-449-5263)

I. Cherry Creek Monitoring

John H. Lambing, WRD, Project Chief (406-449-5263)

A. Objective: To collect streamflow and sediment data for Cherry Creek near Terry (station 06326555). These data are essential for evaluating the feasibility of possible future reservoir construction.

B. Procedure: Standard U.S. Geological Survey methods of data collection will be used.

C. Report Products: Data will be published by USGS in the annual report, Water Resources Data for Montana. Provisional data will be available to BLM upon request.

D. Distribution of Funds: (MT-930-4340-06-255S)

| | |
|---|---|
| Streamflow data (seasonal) | $ 7,500 |
| Sediment and conductance data (seasonal) | 8,500 |
| TOTAL | $ 16,000 |

E. Project Duration and Outyear Funding: Next year's funding will be at a comparable figure to current year. The station is planned for continuation through FY 2002.

II. Flint Creek Monitoring

John H. Lambing, WRD, Project Chief (406-449-5263)

A. Objective: To collect water-quality data for Flint Creek near the abandoned Londonderry Mine. The data are essential for characterizing the effect of the mine on water quality in Flint Creek.

B. Procedure: Standard U.S. Geological Survey techniques for water resources investigation and data collection will be used to determine the water quantity and quality of Flint Creek and the mine-adit discharge.

C. Report Products: Data will be published by USGS in the annual report, Water Resources Data for Montana. Provisional data will be available to BLM upon request.

D. Distribution of Funds: (MT-930-4760-06-255S)

| | |
|---|---|
| Water-quality data | $ 35,000 |
| TOTAL | $ 35,000 |

E. Project Duration: Current year only.

III. Landfill Characterization

Robert E. Davis, WRD, Project Chief (406-449-5263)

A. Location: FY 1992 study sites will be near Terry, Townsend, and Virginia City, MT

B. Objective: To characterize the hydrology at selected disposal sites on BLM land in Montana.

C. Procedure: Characterizations will include descriptions of topography, surface drainage, land ownership, land use, population, surface geology, near-surface hydrogeology, and estimated potential for aqueous transport of undesirable constituents. Other activities, such as drilling or geophysical investigations, will not be conducted without prior arrangement with BLM.

D. Report Products: The results for each site studied will be provided to BLM in a USGS Administrative Report upon completion of each site study characterization.

E. Distribution of Funds: (MT-930-4760-06-255S)

| | |
|---|---|
| Salaries | $ 41,550 |
| Travel | 7,650 |
| Laboratory | 4,350 |
| Supplies | 4,350 |
| Miscellaneous | 2,100 |
| TOTAL | $ 60,000 |

F. Project Duration and FY 93 Funding: The landfill characterization will be completed at end of FY 1992. Plans are to select additional sites for FY 1993 evolution. Based upon three sites, FY 1993 funding would be approximately $70,000.

NEVADA

SUMMARY OF FUNDS - FY 92
WATER RESOURCES DIVISION

| Project Name | 4340 |
|---|---|
| I. Operation and maintenance of three stream gages, four water quality monitors, and periodic water-quality measurements for Ely and Las Vegas Districts, Nevada | $ 58,275 |
| II. Operation of Stream Gage, Elko District | 9,025 |
| TOTAL | $67,300 |

Total for State of Nevada: $ 67,300

NEVADA

Billy Templeton, BLM State Director (702-785-6590)
Jim McLaughlin, BLM Hydrologic Investigations Coordinator (702-785-6467)
Jon O. Nowlin, WRD, District Chief (702-887-7600)

I. Operation and Maintenance of Three (3) Gaging Stations.
Craig Westenberg, Project Chief, (702-897-4000)

A. Location:

Las Vegas District, Nevada.

B. Objectives:

1. To collect streamflow and water quality data for Las Vegas Wash, Meadow Valley Wash, and Muddy River.

2. To provide data for estimating the magnitude of salt contributions from public lands.

3. To develop a rational salinity control plan.

C. Product Output:

1. Basic data will be published annually in the USGS annual water data report for Nevada.

2. A summary report will be prepared presenting the salt budgets.

D. Distribution of Funds: (NV-930-4340-14-255S)

| | |
|---|---|
| Streamflow records (hourly data, daily record) | $ 27,075 |
| Specific conductance monitor (hourly data, daily record) | 26,000 |
| Periodic TDS, sediment samples, reconnaissance samples, data compilation and analysis | 5,200 |
| TOTAL | $ 58,275 |

E. Project Duration: This monitoring will end in FY 1996.

II. Operation and Maintenance of One (1) Stream Gage: Rick Young, Project Chief, (702-738-5322)

A. Location: Dixie Creek near Elko, Nevada

B. Product Output:

1. Data from this gage will be entered into WATSTORE and published in the annual report "Water Resources Data for Nevada."

2. BLM Districts will be provided a year-end station analysis.

C. Distribution of Funds: (NV-930-4340-14-255S)

| | |
|---|---|
| Operation and Maintenance of Gage | $ 9,025 |
| TOTAL | $ 9,025 |

D. Project Duration: Stream gaging will end in FY 1998.

NEW MEXICO

SUMMARY OF FUNDS - FY 92
WATER RESOURCES DIVISION

| Project Name | 4110 | 4340 |
|---|---|---|
| I. Aneth Project | $ 15,000 | $ 15,000 |
| II. Surface Water Gaging | | 20,000 |
| TOTALS | $ 15,000 | $ 35,000 |

Total for State of New Mexico: $ 50,000

NEW MEXICO

Larry Woodward, BLM State Director (505-438-6030)
Kirk Koch, BLM Hydrologic Investigations Coordinator (505-438-7429)
Russell Livingston, WRD District Chief (505-262-5399)

I. Aneth Project

Geoffrey Freethey, WRD Project Chief (801-524-4184)

A. Location: Navajo Reservation lands in the southeastern corner of Utah

B. Objective: Investigate the hydrology and water quality of the Aneth Project area and water quality of the Aneth Project area in southeastern Utah.

C. Technical Tasks:

1. Develop the project plan.
2. Search the literature of airborne electromagnetic surveying and surface resistivity.
3. Inventory wells and springs.
4. Collect water samples at approximately 30 sites.
5. Perform lab analysis of water samples for common ions, density, trace metals and isotopes.
6. Enter and store information in a data base.
7. Conduct preliminary graphic and statistical analysis on collected data.

D. Techniques: Accepted techniques for water resources investigations of USGS (TWRI) will be employed.

E. Project Duration and Cooperators:

The project is a multi-year effort scheduled to terminate at the end of FY 1995. It is funded with money from the U.S. Environmental Protection Agency, The U.S. Bureau of Reclamation, USGS, the Bureau of Indian Affairs, and the Utah Division of Oil, Gas, and Mining. Special additional funding may come from the Texaco and Mobil Oil Companies, and from Phillips Petroleum.

F. Reports: The FY 1992 product will be a USGS verbal progress briefing to the appropriate BLM and cooperating agency audience.

G. Funding: The BLM's 15 percent prorata share of FY 1992 project costs will be split between the following accounts:

NM-930-02-4340-10-255S - $ 15,000
NM-920-02-4111-16-255S - $ 15,000

Next year, BLM anticipates increased funding, possibly to $75,000.

II. Surface Water Gaging

A. Location:
1. Rio Puerco above Arroyo Chico, NM
(USGS Station 0833400)

2. Red River below fish hatchery, near Questa, NM
(USGS Station 08266820)

B. Objective: Develop a dependable surface water record for two gaging stations draining BLM lands.

C. Procedures: Standard USGS techniques of water resources investigations (TWRI) will be employed.

D. Products: Data will be published in final form in the annual USGS Water Resources Data for New Mexico. Provisional unpublished data will be made available upon BLM request.

E. Funding: NM-930-02-4340-14-255S - $ 20,000

TOTAL $ 20,000

F. Project Duration and Outyear Funding: Both gages will be operated for BLM through FY 1996. Next year's funding is estimated at $25,000 with future funding anticipated significantly higher, since more stations are planned.

OREGON

SUMMARY OF FUNDS - FY 92
WATER RESOURCES DIVISION

| Project Name | 6333 | 6334 |
|---|---|---|
| I. Operation and Maintenance of Three Stream Gages | $ 22,680 | $ 1,750 |
| II. Rainfall-Runoff Modeling | | |
| TOTAL: | $ 22,680 | $ 1,750 |

Total for the State of Oregon: $ 24,430

OREGON

Dean Bibles, BLM State Director (503-280-7024)
Bill Brookes, BLM Hydrologic Investigations Coordinator (503-280-7054)
M.D. Fretwell, WRD District Office Chief (503-231-2009)

I. Operation and Maintenance of Three Stream Gages

A. Location:

1. Tucca Creek near Blaine, Oregon with data collection platform (OR-080), Salem District.

2. East Fork Lobster Creek near Alsea, Oregon with data collection platform (OR-080), Salem District.

3. Star Gulch near Ruch, Oregon (OR-110), Medford District.

B. Product Output:

1. Data from these gages will be entered into WATSTORE and published in the annual report Water Resources Data for Oregon.

2. BLM Districts will be provided primaries and a year-end station analysis for these gages.

C. Distribution of Funds:

| | |
|---|---|
| Operation and Maintenance of three gages @ $7,560, two chargeable to OR-080-6333-14-255S and one chargeable to OR-110-6333-14-255S | $ 15,120 |
| Operation and Maintenance of one gage @ $7,560 chargeable to OR-110-6333-14-2555 | 7,560 |
| Installation, operation and maintenance two data collection platforms chargeable to OR-080-6334-11-255S | 1,750 |
| TOTAL | $ 24,430 |

D. Project Duration and Outyear Funding: FY 93 and outyear funding will be approximately $25,000 per year. The three gages will cease operation in FY 2002.

## II. Determining Effects of Forest Practices on Hydrology Using Rainfall-Runoff Modelling

John Risley, WRD Project Chief (503-231-2251)
Chester Novak, BLM Project Inspector (503-375-5626)

### A. Location:

Twelve small basins in the Oregon Coast Range will be modeled this fiscal year.

### B. Objective:

The objective of this study will be to calibrate the Modular Hydrologic Modeling System (MHMS), a mathematical computer model, for twelve coastal Oregon watersheds. MHMS will be calibrated to use inputs of precipitation and evaporation to simulate streamflow within 20 percent. MHMS is an updated version of the Precipitation-Runoff Modeling System (PRMS) model. Using UNIX system work-station technology, MHMS has improved graphic capabilities and a modular framework for easier model modification and development.

### C. Approach:

MHMS is designed to function as either a lumped or distributed-parameter model and will simulate both mean daily flows and storm flow hydrographs. MHMS components are designed around the concept of partitioning a watershed into units on the basis of characteristics such as slope, aspect, vegetation, soil, and precipitation distribution. Each unit is considered homogeneous with respect to its hydrologic response and is called a hydrologic response unit (HRU). A water balance and an energy balance are computed daily for each HRU. The sum of the response of all HRUs, weighted on a unit-area basis, produces the daily system response and the streamflow from the watershed. Partitioning provides the ability to impose land-use or climate changes on parts or all of the watershed, and to evaluate resulting hydrologic impacts on each HRU and on the total watershed.

For this study, system inputs will be precipitation and pan evaporation. Precipitation is reduced by interception and becomes net precipitation delivered to the watershed surface. The input of pan evaporation drives the processes of evaporation and transpiration. The watershed system is conceptualized as a series of reservoirs whose outputs combine to produce the total system response.

Streamflow data on an hourly and daily basis will be retrieved from the USGS ADAPS database. Hourly and daily precipitation data will be keyed onto the Oregon PRIME computer from handwritten data sheets supplied by BLM. Air temperature data will also be keyed on the PRIME from data sheets. Streamflow, precipitation, and temperature

data files will be merged into a single ASCII data file formatted for MHMS for each basin. Land use information will be digitized and entered into GIS data files. Soils information will be supplied from Soil Conservation Survey reports, vegetation information will be supplied from BLM aerial photography, and topographic information will be acquired from USGS digital elevation models.

The entire range of flow for each of the twelve basins will be calibrated. Part of the data (roughly one-half) will be used for model validation.

After the calibration and validation of the model are accomplished, an analysis will be performed to identify sensitivity of model results to changes in land-use and other parameters. Results from Needle Branch, Deer Creek, and Flynn Creek will be considered with results from an earlier calibration of PRMS on East Fork of Lobster Creek, a nearby watershed, to assess transferability of model results.

Simulation of eight additional nearby coastal watersheds using MHMS will be completed in fiscal year 1992 if remaining funding is achieved in that year.

D. Report:

A Water Resource Investigation Report will be written and completed by September 1992.

E. Distribution of Funds: BLM funding ended in FY 1991.

F. Project Duration: The project will be completed 9/30/92.

UTAH

SUMMARY OF FUNDS - FY 92
WATER RESOURCES DIVISION

| Project Name | 4340 |
|---|---|
| I. Identification and Quantification of Mechanisms Causing Decreasing Salt-crust Thickness, Bonneville Salt Flats, Western Utah | $ 570,000 |
| TOTAL | $ 570,000 |

Total for State of Utah: $ 570,000

UTAH

Jim Parker, BLM State Director (801-539-4010)
Boyd Christensen, BLM Hydrologic Investigations Coordinator (801-539-4057)
Phil Allard, BLM Project Inspector (801-977-4335)
Harvey Lee Case III, WRD District Chief (801-524-4065)

## I. Identification and quantification of mechanisms causing decreasing salt-crust thickness, Bonneville Salt Flats, western Utah

James L. Mason, Project Chief (801-524-4186)

### A. Setting:

From 1960 to 1988 the thickness of the salt crust, which forms the surface of the Bonneville Salt Flats and covers an area of about 50 square miles, has been decreasing by about 1 percent per year (S.J. Brooks, U. S. Bureau of Land Management, written commun., 1989). This decrease is of concern to the BLM because the Bonneville Salt Flats is a unique geologic feature and recreation area and according to management plans drafted in 1985, should be preserved for future generations. Possible causes could be related to (1) climatic and/or land-surface fluctuations that create long-term "natural" changes in the hydrologic and hydrochemical system, (2) human interference that results in changes in the hydrologic or hydrochemical system (primarily withdrawal of brine for potash production and construction of highway I-15), or (3) a combination of the two.

### B. Objectives:

The main purpose of this investigation is to conceptualize and quantify, where feasible, the natural processes and human activities that cause removal of salt from the Bonneville Salt Flats area. The results will be used by the U.S. Bureau of Land Management to decide how to manage and preserve this unique geographic feature.

### C. Approach:

The study is divided into three separate study elements, all requiring a data-collection and compilation phase and a data analysis and interpretation phase. The three study elements will be:

1. Transport of salt in solution away from the Salt Flats by wind-driven surface ponds.

2. Transport of salt in solution through the unsaturated zone and then by movement in solution through the shallow-brine aquifer to collection canals

3. Estimating the natural salt balance in Pilot Valley, a relatively undeveloped hydrologic system with a salt crust, to use as a base line to approximate what natural salt-transport mechanisms were in effect in the Bonneville Salt Flats by each transport mechanism identified.

The essential tasks of Study Element 1 are field investigation, aerial photography, sampling, and chemical analyses.

The tasks to accomplish for Study Element 2 include gathering hydrologic and hydrochemical data from new observation wells, locating and monitoring previously constructed observation wells, coring and obtaining laboratory analyses of cores from the unsaturated zone, drilling deeper holes to establish the hydrologic nature of the connection between the alluvial-fan and the shallow-brine aquifer, aquifer testing, sampling, water-level monitoring, and analyzing the data collected by Reilly Industries (the most important of which is brine withdrawals), drilling at least one deep hole to establish the vertical hydraulic connection between the basin-fill aquifer and the shallow-brine aquifer obtaining and compiling flow and water-quality data necessary to calculate a salt budget and a ground-water budget for the area, and, if feasible, constructing and developing sectional solute-transport models and possibly an areal solute-transport model to simulate the hydrochemical system as conceptualized.

Study Element 3 will include installation of a meteorologic station on the playa to monitor air movement, precipitation, and evaporation; drilling 10 water-level and water-quality monitoring wells to determine seasonal changes in dissolved-solids concentration, density, and water levels of the brine under the playa; and aerial photography and entry of data into GIS to monitor the seasonal variation of the salt-crust area.

D. Reports

Informal progress reports will be provided quarterly to BLM and the TRC. The WRD will provide an end of FY report. The draft of the final project report will be submitted to BLM by 12/31/93, and the final interpretive report will be approved for U.S. Geological Survey publication by 7/1/94. Included with the conclusions of the final report will be Water Resources Division's suggestions on appropriate procedures or management actions which could be used to stop or reverse the loss of salts from the Bonneville Salt Flats.

E. Distribution of Funds: (UT-020-4340-07-255S)

| | |
|---|---|
| Study Element 1 | $ 86,300 |
| Study Element 2 | 412,400 |
| Study Element 3 | 33,300 |
| Technical Services | 38,000 |
| TOTAL | $570,000 |

F. Project Duration and Next Year's Funding: All project activities with the exception of draft and final report writing will be completed by the end of FY 1993. The funding level for FY 1993 is estimated to be $422,000.

WASHINGTON

SUMMARY OF FUNDS - FY 92
WATER RESOURCES DIVISION

| Project Name | 4340 | 6333 |
|---|---|---|
| I. Sediment Sample Analysis - Salem | | $ 4,000 |
| II. Sediment Sample Analysis - SC | $ 4,500 | |
| | $ 4.500 | $ 4,000 |

Total for State of Washington: $ 8,500

WASHINGTON

Dean Bibles, BLM State Director (503-280-7024)
Bill Brookes, BLM Hydrologic Investigations Coordinator (503-280-7054)
John E. Costa, WRD, Vancouver Project Office Chief (206-696-7811)
Dan Gooding, WRD, Chief for Sediment Laboratory (206-696-7897)

I. Sediment Sample Analysis-Salem District

A. Location: Various field sites, BLM Salem District, OR.

B. Product Output: Data will be entered into WATSTORE. Lab sheets with analytical results will be provided to BLM, Salem District Project Inspector.

C. Distribution of Funds: (OR-080-6333-14-255S)

| | |
|---|---|
| Salaries | $4,000 |
| TOTAL | $4,000 |

D. Project Duration: One year, ending 9/30/92

II. Sediment Sample Analysis - Service Center

A. Location: Rio Chama, New Mexico. The three sites are located below El Vado reservoir along a 30-mile reach. The sites are named El Vado, Nutrius and Cebolla.

B. Objective: For frozen core substrate samples, determine grain-size gradation from the gravel size down to the sand/silt break.

C. Product Output: All data is to be compiled and a diskette and hardcopy will be furnished to BLM Service Center Project Inspector in Denver.

D. Distribution of Funds: (SC-210-4340-14-255S)

| | |
|---|---|
| Salaries | $4,500 |
| TOTAL | $4,500 |

E. Project Duration: One year, ending 9/30/92.

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